

Securing Data for Space Communications, Phase I

Completed Technology Project (2005 - 2005)



Project Introduction

NASA's vision of data exchange between space and ground nodes would involve the space network accessing public infrastructure such as the internet. Hence, advanced security measures have to be developed to ensure information integrity and authentication. The proposed innovations in this work are 1) A hierarchical security model, where each level has a different security requirement and varying capabilities (such as power and ad hoc measure), 2) An adaptive key management protocol suite that would cater to the security needs of the network at the various levels, and 3) A novel key management scheme that uses threshold cryptography and group key management concepts. The significance of our approach is to provide a key management solution that provides strong authentication and data integrity, a solution that is flexible and can be adapted according to different security requirements and capabilities of the network and a scheme that considers the performance capabilities of the participating nodes and provides solutions accordingly.

Anticipated Benefits

Wireless handheld devices are in use in several commercial applications including office buildings, universities and industrial plants. However, secure communication is one of the primary limitations of current commercial/military wireless networks. Current IEEE standards and solutions are inadequate as far as Information Assurance is concerned. Hence, the proposed authentication and key management solution is attractive for NASA as well as the private sector because it provides a unique methodology that ensures secure transmission of data between the nodes of any wireless network. It can be easily extended for mobile environments that include both wired and wireless segments based on varying commercial standards. With the availability of secure wireless access, organizations can provide wireless access to their servers outside their firewalls and buildings. In order to realize NASA's vision of Sensor-Web entailing a host of in-space and terrestrial communication links, enhanced network protocols and technologies are desired. Hence the developed authentication and data integrity methodology will be highly applicable to future NASA networks that would support secure communication among NASA spacecraft, commercial GEO networks and the ground systems. The proposed methodology will ensure authenticated data transfer between the public domain (Internet) and space-based networks. It will also satisfy the goals and objectives of NASA's Space Communications project, particularly for Proximity Wireless networks that aim to develop "energy-efficient, reliable, miniaturized, integrated wireless network technologies to enable robotic missions on planetary surfaces and in-space vehicles."



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

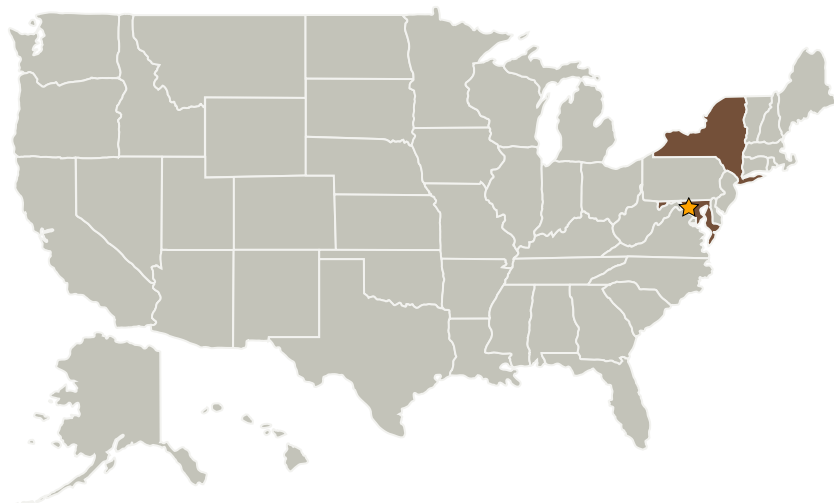
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|------------------------------------|-------------------------|-------------|---------------------|
| ★Goddard Space Flight Center(GSFC) | Lead Organization | NASA Center | Greenbelt, Maryland |
| CompSys Technologies Inc. | Supporting Organization | Industry | Amherst, New York |

Primary U.S. Work Locations

| | |
|----------|----------|
| Maryland | New York |
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Sara J Woo

Principal Investigator:

Sumita Mishra

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - TX05.3 Internetworking
 - TX05.3.3 Information Assurance